programmed at least once. Subsequently, a boost pulse having a boost programming level lower than the programming level is applied to the flagged cells.

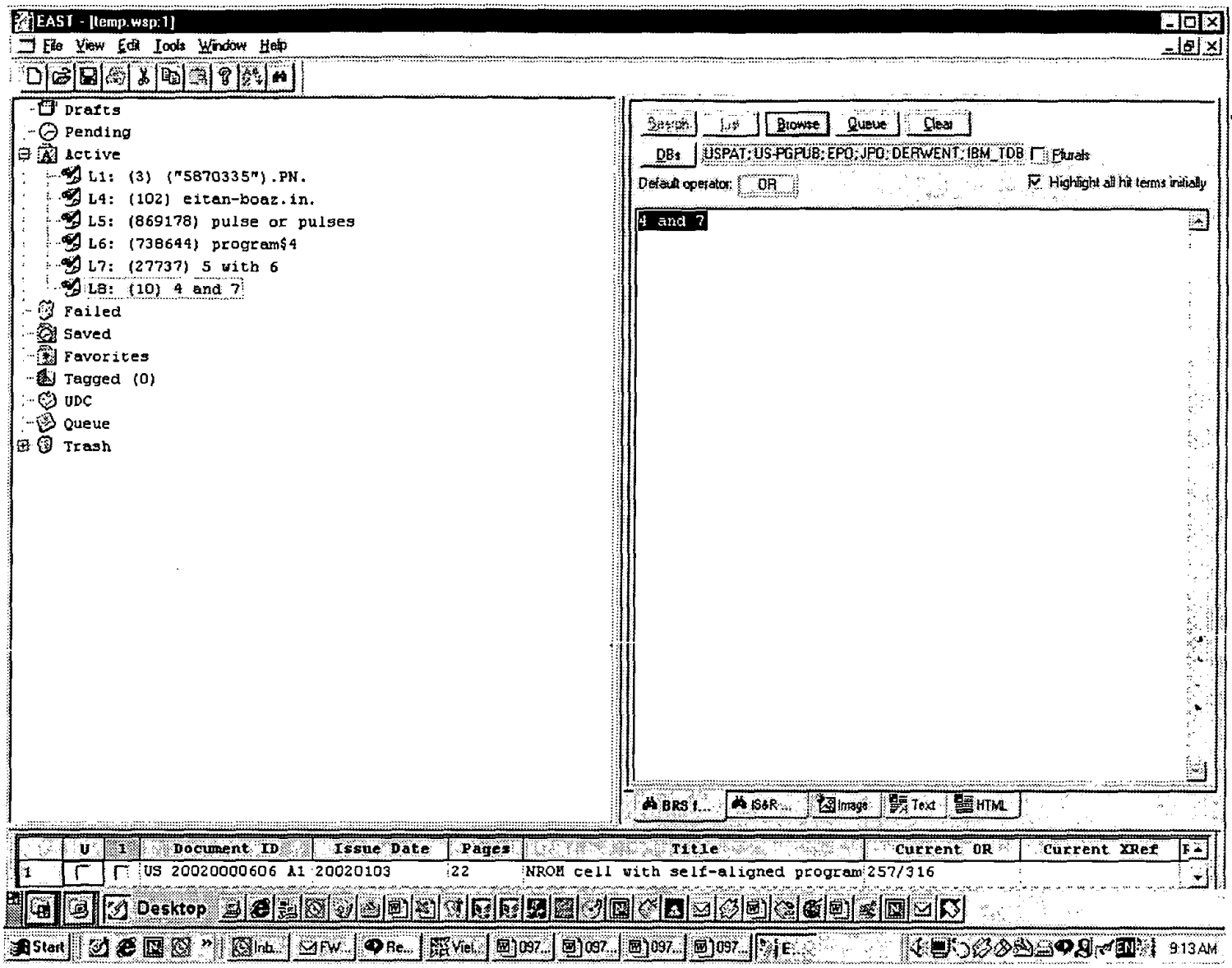
BSPR:
A typical method for programming a nonvolatile semiconductor memory cell, such as a nitride, read only memory cell (NROM), involves initially applying a programming pulse thereto, thus causing charge to become trapped in a retention layer of the cell. This trapped charge induces the threshold voltage V.sub.TH of the cell to increase.

BSPR:
Ordinarily, the programming pulse is followed by a program verify pulse . Via various known in the art methods, the program verify pulse verifies the programmed level of the cell. In memory cells such as the NROM, this is accomplished via a reverse read action. If the program verify pulse reveals that the cell has not yet reach the programmed level, an additional programming pulse is applied, followed by a subsequent program verify pulse . Typically, during the programming process, the programming pulses increase in voltage level, commencing at a relatively low voltage level and terminating at a higher level voltage. An example of such is described in Applicant's co-pending U.S. patent application Ser. No. 09/563,923 Programming Of Nonvolatile Memory Cells, filed on May 4, 2000 and incorporated herein by reference.

BSPR:
When the cell passes program verify, the cell is considered "programmed", and the programming process is terminated. If however, due to noise, charge leakage and the like, the program verify pulse of a programmed cell does not accurately verify the programmed state of the cell, further programming may induce too much charge into the retention layer, and cause a condition known as over-programming . In applications such as NROM, it is important to prevent over-programming of the cell. Over-programming of the cell creates a broad pocket of trapped charge, which reduces the longevity of the cell.

BSPR:
Alternatively, U.S. Pat. No. 5,172,338 discusses repeated query of the cells. Each cell that does not pass program verify, either on a previous query or on a subsequent query, receives a program pulse . However, for those cells which pass a previous program verify, yet failed a subsequent verify, it is risky to apply program pulses, since the continuance of programming subjects those cells to the possibility of over-programming .

BSPR:
There is therefore provided in accordance with a preferred embodiment of the present invention, a method for programming an array having a multiplicity of


EAST - [temp.wsp:1]
File View Edit Tools Window Help
Drafts
Pending
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L1: (3) ("5870335").PN.
L4: (102) eitan-boaz.in.
L5: (869178) pulse or pulses
L6: (738644) program$4
L7: (27737) 5 with 6
L8: (10) 4 and 7
Failed
Saved
Favorites
Tagged (0)
UDC
Queue
Trash
Search
List
Browse
Queue
Clear
DBs
USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB
Plurals
Default operator:
OR
Highlight all hit terms initially
4 and 7
BRS f...
IS&R...
Image
Text
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I
Document ID
Issue Date
Pages
Title
Current OR
Current XRef
1
US 20020000606 A1 20020103
22
NROM cell with self-aligned program
257/316
Desktop
Start
9:13 AM

DOCUMENT-IDENTIFIER: US 5042009 A
TITLE: Method for programming a floating gate memory device

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INZZ:
Eitan; Boaz

CLPV:
repetitively applying pulses to said control gate to thereby cause hot electron injection programming of said transistor.

CLPV:
wherein said programming voltage generator is incapable of generating an output current which said transistor would normally conduct if (1) said floating gate were unprogrammed, (2) said programming drain voltage was applied to said drain, and (3) a programming control gate voltage equal to the amplitude of said pulses was applied to said control gate.

CLPV:
means for repetitively applying pulses to said control gate to thereby program said floating gate transistor by hot electron injection.